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DETAILED DESCRIPTION

[Detailed Description of the Invention]**[0001]**

[Field of the Invention]This invention relates to the sheet feeding device of the automatic manuscript conveying machine used for a facsimile machine, a reproducing unit, etc.

[0002]

[Description of the Prior Art]Conventionally, in the automatic manuscript conveying machine, when a manuscript inserts, in order that a user may prevent inrush to paper mackerel ***** (a separate roller and a retard roller) and may perform stable feeding, the shutter is arranged in the mid-position of a pickup roller and paper mackerel *****. And a shutter is constituted so that a pickup arm may always be interlocked with mechanically, and you make it the rocking operation of this pickup arm interlocked with, and the ascent and descent operation of a shutter is made to be performed. In order to make it go up so that a shutter may be estranged from a manuscript tip, it constituted so that the rotational fulcrum of a shutter might serve as a pickup roller and the same axle.

[0003]

[Problem(s) to be Solved by the Invention]if the shutter is always mechanically interlocked with the pickup arm as mentioned above -- many -- when the paper of several sheets is inserted, a pickup roller (pickup arm) falls and the problem that width is small and a shutter does not fully go up occurs. The shutter also moved up and down in connection with moving up and down, whenever a pickup roller sends one manuscript, and there were also problems -- a manuscript will be damaged in the middle of manuscript conveyance. If the rotational fulcrum of a shutter is provided in a pickup roller and the same axle as mentioned above, the arm which connects a rotational fulcrum and a shutter body will become short, and the rotation angle range required for rise and fall of a shutter will become large. Therefore, when raising a shutter, in order to keep the tip from contacting the pivot of a separate roller, the space from

the pivot of a pickup roller to the pivot of a separate roller needed to be secured enough, but it was difficult to secure such a space.

[0004]

[Means for Solving the Problem]The issue which is going to solve this invention is like the above, and a means for next solving this technical problem is explained. Namely, a separate roller arranged on a driving shaft in claim 1, A pickup arm in which this driving shaft is provided rotatable as a fulcrum, A pickup roller formed at a tip of this pickup arm rotatable, It is the sheet feeding device provided with a shutter formed rockable from a regulated position which is located in the middle of said pickup roller and said separate roller, and regulates a tip of a manuscript, Provide a driving member which drives a shutter and this driving member, When there is no manuscript, a position which is interlocked with a pickup arm and descends a shutter is operated, when there is a manuscript, linkage with a pickup arm and a shutter is canceled, and it is made to raise a shutter by an elastic member.

[0005]In claim 2, a regulating member which regulates rotation of said shutter is provided.

[0006]

[Embodiment of the Invention]The automatic manuscript conveying machine (following ADF device) 1 provided with the sheet feeding device 2 of this invention is explained using drawing 1 and drawing 2. Drawing 1 is a side sectional view of ADF device 1 in which the state where the shutter 21 descended is shown, and drawing 2 is a side sectional view of ADF device 1 in which the state where the shutter 21 went up is shown. ADF device 1 with which image forming devices, such as a facsimile machine and a reproducing unit, are equipped is shown in drawing 1 and drawing 2. This ADF device 1 comprises the upside sheet feeding device 2 and the lower conveying machine 3. The inner guide 41 is allocated by the upper surface of this conveying machine 3, and installation of the manuscript sheaf 5 is enabled on the right part (manuscript loading slot 1a to ADF device 1) of this inner guide 41, and the supply tray (not shown) which stands in a row in it. And one sheet dissociates at a time with the sheet feeding device 2, it feeds with the manuscript sheaf 5 laid on the inner guide 41, and the manuscript 5a is made to be conveyed in ADF device 1 inside.

[0007]The manuscript carrying path is established in ADF device 1, and the manuscript 5a in which the inside of this manuscript carrying path is sent is made to be read in the halfway part of this manuscript carrying path by the manuscript reading section (not shown) allocated under said conveying machine. The manuscript 5a after being read is discharged to the discharging tray (not shown) which stands in a row in the right part (manuscript outlet 1b to ADF device 1) of the outer guide 45. Said manuscript carrying path is formed of the outer guide 40 provided in the undersurface of the sheet feeding device 2, the inner guides 41, 42, 43, and 44 provided in the conveying machine 3, and outer guide 45 grade. And in order to enable conveyance of the manuscript 5a, in accordance with the manuscript carrying path, the retard roller 33 and the

feed roller 34**35**36 grade are arranged. These rollers are driving rollers and the feed rollers 34, 35, and 36 are rotating to the direction (henceforth, manuscript feeding direction) which conveys the manuscript 5a into ADF device 1. Although the retard roller 33 is rotating the manuscript 5a to the direction [backward feed / direction / loading slot / 1a / manuscript], the manuscript 5a is conveyed into ADF device 1 by operation of the separate roller 6 formed in the sheet feeding device 2 so that it may mention later.

[0008]Next, said sheet feeding device 2 is explained. The sheet feeding device 2 is equipped with the manuscript ***** mechanism and the shutter mechanism, and a manuscript ***** mechanism is first explained using drawing 3 from drawing 1. Drawing 3 is a top view of the important section of the sheet feeding device 2 in which the state where the shutter 21 descended is shown. The power of the motor which is not illustrated is transmitted via a gear etc., he is trying to drive the driving shaft 4, and the separate roller 6 is arranged on this driving shaft 4. This separate roller 6 feeds with the manuscript 5a by rotation to the manuscript feeding direction of the driving shaft 4. The pickup arms 7 and 8 are formed in the both sides of the separate roller 6 by making the driving shaft 4 into a fulcrum, enabling free rotation, and the pickup roller 9 is formed at the tip of these pickup arms 7 and 8 rotatable. Between the pickup arm 7 and said outer guide 40, the elastic member 10 formed by a spring etc. is infixed, and he is trying to energize the pickup arm 7 (and pickup roller 9) upwards by making the driving shaft 4 into a fulcrum.

[0009]The separate roller 6 is attached to the driving shaft 4 via the one-way clutch 11, and when the separate roller 6 rotates in the direction (manuscript feeding direction), he is trying to make it to make a manuscript feeding direction rotate the separate roller 6 by rotation of this driving shaft 4, and idle. The gear 12 is fixed to the separate roller 6 on the same axle, and he is trying for the separate roller 6 and the gear 12 to rotate in one. The gear 13 is fixed also to said pickup roller 9 on the same axle, and he is trying for the pickup roller 9 and the gear 13 to rotate in one. And the belt 14 is wound around the gear 12 and the gear 13, and rotation of the driving shaft 4 is made to be transmitted also to the pickup roller 9.

[0010]The torque limiter 15 is formed between the gear 13 and said pickup arm 7, and the gear 13 is having rotation restricted in response to the load torque by the torque limiter 15. And if the torque more than the load torque (marginal torque) restricted by this torque limiter 15 is added to the gear 13, this gear 13 will rotate to the pickup arm 7. If the driving shaft 4 begins rotation, torque is delivered that it mentioned above to the gear 13, and the gear 13 tends to rotate, but rotation of this gear 13 is restricted by the load torque by the torque limiter 15. On the other hand, as mentioned above, the pickup arm 7 is formed to the driving shaft 4, enabling free rotation. For this reason, as for the torque of the driving shaft 4, that rotation is turned to the easy pickup arm 7 as compared with rotation of the gear 13. Therefore, the pickup arm 7 carries out downward rotation by making the driving shaft 4 into a fulcrum, it is fixed relatively

to the pickup arm 7, and the gear 13 does not rotate. As a result, the pickup roller 9 descends according to downward rotation of the pickup arm 7. As the descending pickup roller 9 shows drawing 2, when the manuscript sheaf 5 is contacted, the pickup arm 7 cannot descend any more. As a result, all the torque of the driving shaft 4 is turned to the gear 13, and the torque added to this gear 13 from the driving shaft 4 exceeds the load torque restricted by the torque limiter 15 in this case. Therefore, the gear 13 rotates to the pickup arm 7, and the pickup roller 9 rotates.

[0011]That is, when the driving shaft 4 rotates to a manuscript feeding direction, the pickup arm 7 is dropped until the one-way clutch 11 is engaged, the torque of said driving shaft 4 is transmitted to the separate roller 6 and the gear 12 and the pickup roller 9 contacts the manuscript sheaf 5 as a result. And if the pickup roller 9 contacts the manuscript sheaf 5, the torque beyond said marginal torque will be added to the gear 13, the pickup roller 9 will rotate, and the manuscript 5a located in the best of the manuscript sheaf 5 will be rounded into ADF device 1.

[0012]When the driving shaft 4 rotates reversely to a manuscript feeding direction, engagement of the one-way clutch 11 is canceled and the transmitting power to the separate roller 6 and the gear 12 is intercepted. Therefore, torque is not transmitted to the pickup arm 7, either, but this pickup arm 7 is rotated upwards according to the energizing force of said elastic member 10. As mentioned later, it is a time of rounding the manuscript sheaf 5 into ADF device 1 altogether, and the manuscript also of one sheet being lost to the inner guide 41 that the driving shaft 4 rotates reversely.

[0013]As shown in drawing 2, the manuscript 5a rounded by the pickup roller 9 in the ADF device 1 inside is first conveyed between the separate roller 6 and said retard roller 33. Paper mackerel ***** comprises the separate roller 6 and the retard roller 33, and he is trying for this paper mackerel ***** to feed said paper carrying path at a time with the one manuscript 5a conveyed from the pickup roller 9 side as follows. At the time of conveyance of the manuscript 5a, to the separate roller 6 rotating to a manuscript feeding direction, the retard roller 33 rotates to an opposite direction, as mentioned above. The retard roller 33 is established in the driving shaft of this roller via the torque limiter, and when the torque more than fixed is added, it enables it to rotate it freely to this driving shaft. The separate roller 6 is welded by pressure to the retard roller 33, and when not inserting a manuscript among both rollers, or when only the one manuscript 5a is inserted, the retard roller 33 is taken to the separate roller 6, the surroundings carry out it, and it rotates it to a manuscript feeding direction. This is because said torque limiter is canceled, when the torque of rotation of the separate roller 6 is added to the retard roller 33.

[0014]The separate roller 6 and the retard roller 33 are allocating the member with a big coefficient of friction of rubber etc. in a periphery. And he is trying for the frictional force

committed between those rollers and manuscripts 5a to become large from the frictional force committed between manuscript 5a and 5a. for this reason, the manuscripts 5a and 5a of two or more sheets – backward feed [the retard roller 33 / one / lowest / in the conveyed manuscript of two or more sheets / side / said / manuscript loading slot 1a] without taking to the separate roller 6 and the surroundings' carrying out when ... has been conveyed by paper mackerel *****. thus, the manuscripts 5a and 5a of two or more sheets -- even when ... is rounded by the pickup roller 9 in the ADF device 1 inside, said paper mackerel ***** dissociates and the manuscript carrying path is made to be fed only with the manuscript 5a of one sheet.

[0015]Although the manuscript 5a with which the manuscript carrying path was fed from paper mackerel ***** is conveyed by said feed roller 34, the revolving speed of the feed roller 34 is set up here more greatly than the revolving speed of the separate roller 6. Therefore, the separate roller 6 is taken, and the surroundings carry out it, and it rotates at the feed roller 34 and the speed until the back end of the manuscript 5a will have escaped from the separate roller 6, if the tip of the manuscript 5a results even in the feed roller 34 as shown in drawing 7. When the separate roller 6 rotates at the feed roller 34 and the speed so that it may mention above, the separate roller 6 will rotate to a manuscript feeding direction relatively to the driving shaft 4. In such a case, as mentioned above, said one-way clutch 11 is cut, and the pickup arm 7 begins rotation upwards. That is, by the pickup roller's 9 once going up, estranging from the manuscript sheaf 5, and setting between a little, if a manuscript is supplied to the feed roller 34, the pickup roller 9 will descend again and the back end of the manuscript 5a will perform ***** of the following manuscript 5a, after the separate roller 6 falls out.

[0016]Next, said shutter mechanism is explained. The pivot 16 is allocated in the ADF device 1 inside rather than the driving shaft 4, and this pivot 16 is formed in the casing of ADF device 1, enabling free rotation. The engaging member 17, the hanging member 18, and the driving members 19 and 19 are fixed to the pivot 16, respectively, and these members are rotated in one with the pivot 16. The support member 46 is fixed on said outer guide 40, and the elastic member 20 formed by a spring etc. is infixied between this support member 46 and said hanging member 18. He is trying for this elastic member 20 to make the energizing force of the direction in which the driving members 19 and 19 carry out upper part rotation by making the pivot 16 into a fulcrum always act.

[0017]The shutter 21 is formed in the manuscript loading slot 1a side of the driving member 19, enabling the free rotation to the casing of ADF device 1. The shutter 21 is installed by said casing with the rocking lever shaft 21a, and fixes the arm 21b towards the separate roller 6 side from this rocking lever shaft 21a. One end of the supporting spindle 21c is fixed at the tip of this arm 21b, and the shutter part 21d is fixed to the other end of the supporting spindle 21c. He is trying to locate the shutter part 21d in the middle of the pickup roller 9 and the separate roller 6 by side view, as shown in drawing 5. The guide rail 19a is formed at the tip of the

driving member 19, said supporting spindle 21c is inserted in this guide rail 19a, and sliding is made free. And he is trying for the shutter 21 to rotate up and down, letting the supporting spindle 21c slide along the guide rail 19a in connection with the vertically and rotationally moving of the driving member 19. The shutter 21 is energized up via the driving member 19 by said elastic member 20 by composition above.

[0018]As mainly shown in drawing 3, the height 8a is formed in the pivot 16 side of said pickup arm 8, and the engagement piece 22 is fixed to this height 8a. On the other hand, the engagement part 17a is projected and formed in said engaging member 17. And the engagement piece 22 and the engagement part 17a are engaged by rotation of the circumference of the driving shaft 4 of the pickup arms 7 and 8, and it is made rotatable [the engaging member 17] considering the pivot 16 as a fulcrum. Since the engaging member 17 and said driving member 19 are constituted so that it may rotate in one as above-mentioned, they also rotate the driving member 19 by rotation of this engaging member 17. And the shutter 21 rotates by rotation of the driving member 19. The shape of the engaging member 17 is not limited to the above-mentioned composition, cuts and lacks a part of cylindrical member, for example, and it may be made for said engagement piece to be engaged by a notch.

[0019]The mechanism for regulating rotation of the shutter 21 is explained using drawing 4. Drawing 4 is a side sectional view of the sheet feeding device 2 in which the rotation regulating conditions of the shutter 21 are shown. By drawing 4, the graphic display of the hanging member 18 and the elastic member 20 is omitted from drawing 5 and below-mentioned drawing 6. As shown in drawing 4 from drawing 1, the regulating member 23 for regulating rotation of the shutter 21 is formed in said support member 46. The regulating member 23 is provided with the solenoid and is enabling the attitude of the core 24 by OFF-ON of the electric power to this solenoid. The hanging member 25 of plane view L type is fixed to the front face of the core 24, and the oblong hole which enables the slide contact of the pivot 16 is established in this hanging member 25. Even if the core 24 moves, he is trying not to start a position shift to the pivot 16 by the hanging member 25 being hung on the pivot 16 in said oblong hole. The gear tooth is formed in linear shape and the rack part 25a is formed in the base part of the shape of L type of said hanging member 25. The gear tooth is circularly formed in the end by the side of the regulating member 23 of the driving member 19, and the tooth part 19b is formed. And the tooth part 19b has geared with the rack part 25a in the state (OFF state) where electric power is not supplied to the regulating member 23. For this reason, in the state where the core 24 has projected, in order not to carry out the position shift of the core 24 at the same time the aforementioned engagement is performed, as for the driving member 19, rotation is regulated. As for the shutter 21 which is in slide contact with the driving member 19, rotation will be regulated in connection with this. If the regulating member 23 drives (ON state), the core 24 will retreat to the regulating member 23 inside, and engagement with the rack part

25a and the tooth part 19b will separate. And rotation regulation of the shutter 21 is also canceled.

[0020]The situation of the vertical swing of the shutter 21 is explained using drawing 7 from drawing 5. Drawing 5 is a side sectional view of the sheet feeding device 2 in case the pickup arms 7 and 8 are in an uppermost position, drawing 6 is a side sectional view of the sheet feeding device 2 when the pickup arms 7 and 8 march in and it is in a position, and drawing 7 is a side sectional view of the sheet feeding device 2 in case the pickup arms 7 and 8 are in the mid-position. In the state where the sheet feeding device 2 is not operating, the pickup arms 7 and 8 are standing by in the uppermost position in the rotatable range. The shutter 21 is descending at this time and the tip of said shutter part 21d is stopped in the crevice established in the inner guide 41 upper surface. Thereby, even if the manuscript sheaf 5 is inserted from said manuscript loading slot 1a, the shutter 21 is hung and it does not rotate. Let the position of the shutter 21 at this time be a regulated position in the following explanation. If ***** of the manuscript sheaf 5 is started, the pickup arms 7 and 8 will descend, and as shown in drawing 6, the pickup roller 9 will contact the upper surface of the manuscript sheaf 5. With descent of the pickup arms 7 and 8, engagement to said engaging member 17 and said engagement piece 22 separates, the driving member 19 goes up by energization of the elastic member 20, and the shutter 21 also goes up in connection with it. The position of the pickup arms 7 and 8 at this time is rounded, consider it as a position, and let the position of the shutter 21 be a position in readiness. And if the feed roller 34 side is fed with the manuscript 5a of one sheet, as mentioned above, the separate roller 6 will take, the surroundings will carry out, the one-way clutch 11 will be cut, and the pickup arms 7 and 8 will go up. If the rotation to the manuscript feeding direction of the driving shaft 4 is continued and the back end of the previous manuscript 5a leaves the separate roller 6 at this time, the one-way clutch 11 will be connected again and the pickup arms 7 and 8 will begin descent. This manuscript sheaf 5 marches in and he is trying for said shutter 21 to stop to a position in readiness in spite of rise and fall of the pickup arms 7 and 8 as mentioned above by making said regulating member 23 into an OFF state during work. If only a quantity predetermined in the pickup arms 7 and 8 rises, said engaging member 17 and said engagement piece 22 tend to be engaged, and also the pickup arms 7 and 8 which are going to go up specifically tend to rotate the pivot 16 via the engaging member 17, but. Rotation of the pivot 16 is prevented by engagement with said rack and a tooth part, and the shutter 21 does not descend by it. The pickup arms 7 and 8 go up only a predetermined height, and let the position with which the engaging member 17 and the engagement piece 22 engage be the mid-position of the pickup arms 7 and 8. A manuscript marches in and the pickup arms 7 and 8 do not have said thing [marching in, rocking between a position and this mid-position, and going up to said uppermost position] during work. and the manuscripts 5a and 5a which constitute the manuscript sheaf 5 -- after being fed with all ... into

ADF device 1, marching in and completing work, the pickup arms 7 and 8 begin a rise towards said uppermost position. Since said regulating member 23 is made into an ON state and regulation of the shutter 21 is canceled, after marching in and completing work here, If the driving member 19 will drive, the shutter 21 will be dropped, if the pickup arms 7 and 8 arrive at said mid-position, and the pickup arms 7 and 8 arrive at an uppermost position, the shutter 21 will arrive at said regulated position.

[0021]Next, the pickup arms 7 and 8 at the time of manuscript ***** and the situation of a drive of the shutter 21 are explained using drawing 8. Drawing 8 is a procedure flow chart of shutter mechanism operation. In the hibernation (state which is not operating) of the sheet feeding device 2, as shown in drawing 4, the shutter 21 descends, it is located in a regulated position, and the pickup arms 7 and 8 are located in an uppermost position. The core 24 has projected the regulating member 23 by the OFF state, and rotation of the shutter 21 is regulated. In this state, a user lays the manuscript sheaf 5 on said inner guide 41, and dashes and sets the manuscript sheaf 5 to the shutter 21 (Step 101).

[0022]If the start key is pressed from this state, it marches in to the sheet feeding device 2 and a start is directed, first, the regulating member 23 will be in an ON state, the core 24 retreats to the regulating member 23 inside, and it will be in the state which shows in drawing 1 and drawing 5 of which rotation regulation of the driving member 19 and the shutter 21 was canceled (Step 102). Subsequently, the driving shaft 4 drives and the pickup arms 7 and 8 start descent from an uppermost position, as shown in drawing 6, it marches in, and a position is reached. The shutter 21 goes up simultaneously and arrives at the position in readiness shown in drawing 6. After this shutter 21 has arrived at the position in readiness, the regulating member 23 is made into an OFF state, and rotation of the shutter 21 is regulated. In Step 104 mentioned later, this is to prevent the shutter 21 from a rise of the pickup arms 7 and 8 being interlocked with, and descending. And the pickup roller 9 drives and ***** of the manuscript 5a is started from the manuscript sheaf 5 (Step 103).

[0023]Manuscripts 5a and 5a ... When ***** is performed, as shown in drawing 6 and drawing 7, the pickup arms 7 and 8 are rounded and are rocked up and down between a position and the mid-position. As mentioned above in detail, after the manuscript 5a reaches the feed roller 34 and ***** of the manuscript 5a of one sheet is completed, the separate roller 6 takes, as for the surroundings, the one-way clutch 11 is cut, and the pickup arms 7 and 8 go up. And if the back end of the manuscript 5a separates from the separate roller 6, the one-way clutch 11 will be connected again, the pickup arms 7 and 8 will march in, it will descend to a position, and ***** of the manuscript 5a will be performed. the manuscripts 5a and 5a in which this work constitutes the manuscript sheaf 5 -- it is repeated until ... is lost (Step 104).

[0024]DS (manuscript detection) sensor is allocated in the pickup roller 9 side of the sheet feeding device 2, and the existence of the manuscript on a supply tray (inner guide 41) is

detected by this DS sensor. If ***** of the manuscript sheaf 5 is completed and the last manuscript is conveyed into ADF device 1, DS sensor will be in an OFF state. Then, the regulating member 23 is made into an ON state, and regulation of the shutter 21 is canceled (Step 105). Subsequently, the counterrotation drive of the driving shaft 4 is carried out to a manuscript feeding direction, for this reason, the one-way clutch 11 is cut, and the pickup arms 7 and 8 start a rise. The pickup arms 7 and 8 pass through the mid-position in the middle of the rise, and said engaging member 17 engages with said engagement piece 22. Since there is no regulation of the driving member 19 by the regulating member 23 unlike the state of Step 104, the pickup arms 7 and 8 go up further, and the shutter 21 also interlocks and they descend. Eventually, as shown in drawing 1 and drawing 5, the pickup arms 7 and 8 arrive at an uppermost position, and the shutter 21 arrives at a regulated position (Step 106).

[0025] And if the pickup arms 7 and 8 are located in an uppermost position and the shutter 21 is located in a regulated position, the regulating member 23 will be made into an OFF state, and the shutter 21 will be again regulated in the rise and fall as well as the state of Step 101 (Step 107). Thereby, a new manuscript sheaf is dashed against the shutter 21, and can be set now.

[0026]

[Effect of the Invention] Like [according to claim 1], separate roller arranged on the driving shaft, and pickup arm in which this driving shaft is provided rotatable as a fulcrum, The pickup roller formed at the tip of this pickup arm rotatable, It is the sheet feeding device provided with the shutter formed rockable from the regulated position which is located in the middle of said pickup roller and said separate roller, and regulates the tip of a manuscript, Provide the driving member which drives a shutter and this driving member, Since linkage with a pickup arm and a shutter is canceled and it was made to raise a shutter by an elastic member when the position which is interlocked with a pickup arm and descends a shutter was operated when there is no manuscript, and there was a manuscript, A rotational fulcrum is provided in the pickup roller side, and the rotational fulcrum of a shutter can be provided in the position which the rotation space of a shutter can secure enough, constituting so that it may go up, while a shutter separates from a manuscript tip. It can constitute so that a pickup arm and a shutter may be engaged or engagement may separate by the vertical swing position of a pickup arm. For this reason, a pickup arm can fall, width can change with the thickness of the inserted manuscript sheaf, and generating with poor regulation that the shutter always interlocked with a pickup arm by engagement does not fully descend can be prevented.

[0027] The thing [that a shutter descends in the middle of conveyance of a manuscript, and a manuscript gets damaged since like and the regulating member which regulates rotation of said shutter were provided] according to claim 2 can be prevented. When opening covering of an ADF device, it can change into the state where the shutter was locked, and jam removing

operation etc. can be performed, without a shutter becoming obstructive also in the time of generating of a paper jam.

[Translation done.]

Figure 2

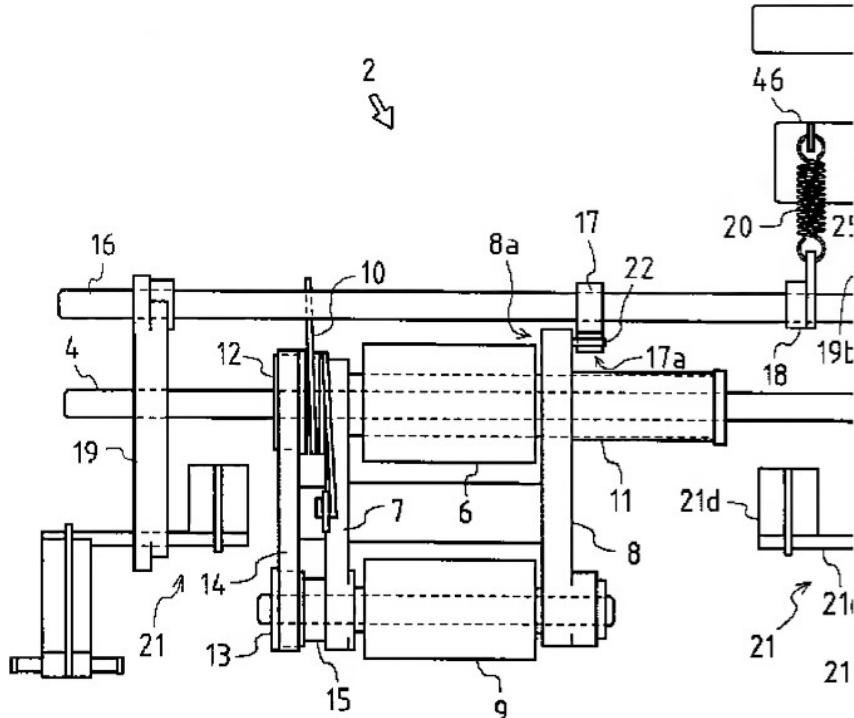


Figure 4

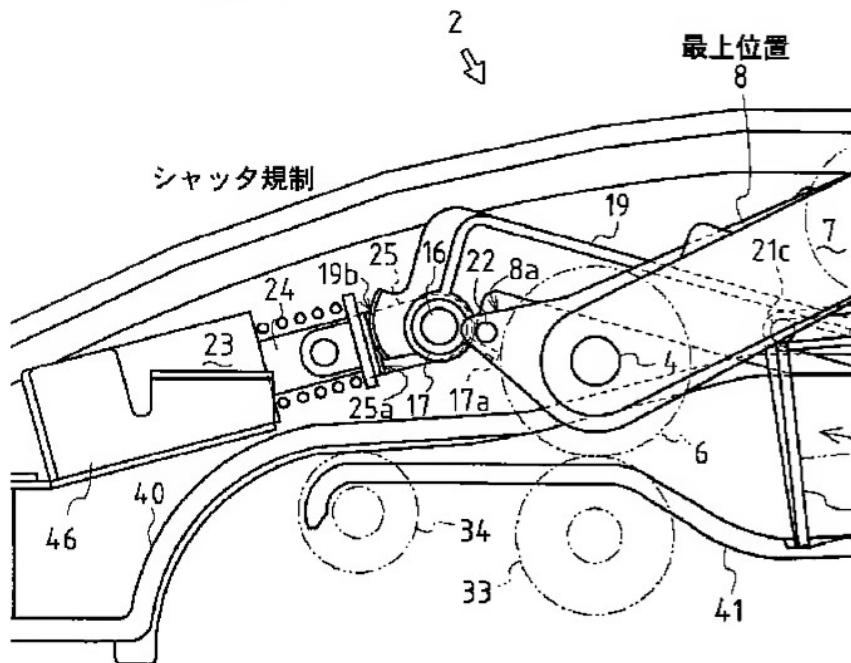


Figure 6

